

In the Claims:

Please cancel claim 10 without prejudice or disclaimer.

Please amend claims 1, 3-9 and 11-13 as follows:

Claim 1 (currently amended) A method for manufacturing a tantalum oxy nitride capacitor comprising:

AN forming a lower electrode on a surface of a semiconductor substrate using a material selected from the ~~ground~~ group consisting of undoped silicon, doped silicon and mixtures thereof;

forming MPS (Metastable Poly Silicon) using gases each containing a silicon source after performing wet etching or dry etching of the lower electrode;

performing a MPS doping in a chamber by using a mixed gas comprising P phosphor and depositing a nitride film in-situ in said chamber without performing a cleaning process or between said MPS doping and said nitride film deposition;

~~depositing a nitride film, in said chamber;~~

depositing a tantalum oxy nitride thin film using a chemical vapor comprising tantalum on the nitride film;

performing a nitrating or nitrifying of a surface of the tantalum oxy ~~nitride oxy-~~ nitride thin film; and

forming an upper electrode by stacking a metal layer on an upper portion of the tantalum oxy nitride thin film.

Claim 2 (original) The method for manufacturing a tantalum oxy nitride capacitor according to claim 1, wherein the MPS formation, the MPS doping, the nitride depositing and the tantalum oxy nitride film depositing are performed in said chamber.

Claim 3 (currently amended) The method for manufacturing a tantalum oxy nitride capacitor according to claim 1, wherein the wet etching or the dry etching of the lower electrode is performed using a gas comprising ~~HF~~ (HF) hydrogen fluoride.

Claim 4 (currently amended) The method for manufacturing a tantalum oxy nitride capacitor according to claim 1, wherein the gas comprising ~~HF~~ (HF) hydrogen fluoride is selected from the group consisting of hydrogen fluoride/water (HF/H₂O), hydrogen fluoride/hydrogen peroxide (HF/H₂O₂), buffered oxide etchant (BOE), hydrogen fluoride/acetic acid/nitrogen dioxide (HF/CH₃COOH/NO₂) and mixtures thereof.

Claim 5 (currently amended) ~~The method for manufacturing a tantalum oxy nitride capacitor according to claim 1,~~

A method for manufacturing a tantalum oxy nitride capacitor comprising:

forming a lower electrode on a surface of a semiconductor substrate using a material selected from the group consisting of undoped silicon, doped silicon and mixtures thereof;

forming MPS (Metastable Poly Silicon) using gases each containing a silicon source after performing wet etching or dry etching of the lower electrode;

performing a MPS doping in a chamber by using a mixed gas comprising phosphor (P);

depositing a nitride film, in said chamber;

depositing a tantalum oxy nitride thin film using a chemical vapor comprising tantalum on the nitride film;

performing a nitrating or nitrifying of a surface of the tantalum oxy nitride thin film; and

forming an upper electrode by stacking a metal layer on an upper portion of the tantalum oxy nitride thin film,

wherein ~~the~~ a gas comprising a silicon source is used in the forming of the MPS formation and said gas selected from the group consisting of SiH₄, Si₂H₆, SiH₂Cl₂ and mixtures thereof.

Claim 6 (currently amended) ~~The method for manufacturing a tantalum oxy nitride capacitor according to claim 1,~~

A method for manufacturing a tantalum oxy nitride capacitor comprising:
forming a lower electrode on a surface of a semiconductor substrate using a material selected from the group consisting of undoped silicon, doped silicon and mixtures thereof;

forming MPS (Metastable Poly Silicon) using gases each containing a silicon source after performing wet etching or dry etching of the lower electrode;

performing a MPS doping in a chamber by using a mixed gas comprising phosphor (P);

depositing a nitride film, in said chamber;

depositing a tantalum oxy nitride thin film using a chemical vapor comprising tantalum on the nitride film;

performing a nitrating or nitrifying of a surface of the tantalum oxy nitride thin film; and

forming an upper electrode by stacking a metal layer on an upper portion of the tantalum oxy nitride thin film.

wherein the MPS doping is performed under a pressure ranging from about 1.0×10^{-3} torr to about 500 torr and at a temperature ranging from about 500°C to about 1000°C.

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Claim 7 (currently amended) ~~The method for manufacturing a tantalum oxy nitride capacitor according to claim 1,~~

A method for manufacturing a tantalum oxy nitride capacitor comprising:
forming a lower electrode on a surface of a semiconductor substrate using a material selected from the group consisting of undoped silicon, doped silicon and mixtures thereof;

forming MPS (Metastable Poly Silicon) using gases each containing a silicon source after performing wet etching or dry etching of the lower electrode;

performing a MPS doping in a chamber by using a mixed gas comprising phosphor (P);

depositing a nitride film, in said chamber;

depositing a tantalum oxy nitride thin film using a chemical vapor comprising tantalum on the nitride film;

performing a nitrating or nitrifying of a surface of the tantalum oxy nitride thin film; and

forming an upper electrode by stacking a metal layer on an upper portion of the tantalum oxy nitride thin film,

wherein the mixed gas comprising P phosphor (P) is a mixed gas comprising PH_3 .

Claim 8 (currently amended) ~~The method for manufacturing a tantalum oxy nitride capacitor according to claim 7;~~

A method for manufacturing a tantalum oxy nitride capacitor comprising:

forming a lower electrode on a surface of a semiconductor substrate using a material selected from the group consisting of undoped silicon, doped silicon and mixtures thereof;

forming MPS (Metastable Poly Silicon) using gases each containing a silicon source after performing wet etching or dry etching of the lower electrode;

performing a MPS doping in a chamber by using a mixed gas comprising phosphor (P);

depositing a nitride film, in said chamber;

depositing a tantalum oxy nitride thin film using a chemical vapor comprising tantalum on the nitride film;

performing a nitrating or nitrifying of a surface of the tantalum oxy nitride thin film; and

forming an upper electrode by stacking a metal layer on an upper portion of the tantalum oxy nitride thin film,

wherein the mixed gas comprising PH_3 phosphor (P) is selected from the group consisting of PH_3/N_2 , PH_3/H_2 , PH_3/SiH_4 , PH_3/Ar and mixtures thereof.

Claim 9 (currently amended) ~~The method for manufacturing a tantalum oxy nitride capacitor according to claim 1;~~

A method for manufacturing a tantalum oxy nitride capacitor comprising:

forming a lower electrode on a surface of a semiconductor substrate using a material selected from the group consisting of undoped silicon, doped silicon and mixtures thereof;

forming MPS (Metastable Poly Silicon) using gases each containing a silicon source after performing wet etching or dry etching of the lower electrode;


performing a MPS doping in a chamber by using a mixed gas comprising phosphor (P);

depositing a nitride film, in said chamber;

depositing a tantalum oxy nitride thin film using a chemical vapor comprising tantalum on the nitride film;

performing a nitrating or nitrifying of a surface of the tantalum oxy nitride thin film; and

forming an upper electrode by stacking a metal layer on an upper portion of the tantalum oxy nitride thin film.

 wherein the nitride depositing is performed by using ammonia NH_3 (NH_3) gas and wherein the nitride depositing is performed under a pressure ranging from about 0.1 torr to about 200 torr and at a temperature ranging from about 600°C to about 850°C.

Claim 10 (currently canceled)

Claim 11 (currently amended) The method for manufacturing a tantalum oxy nitride capacitor according to claim 1, wherein ~~the evaporated tantalum ethylate is the~~ chemical vapor comprising tantalum is evaporated tantalum ethylate.

Claim 12 (currently amended) The method for manufacturing a tantalum oxy nitride capacitor according to claim 1, wherein the nitrating or nitrifying the surface of tantalum oxy nitride thin film postprocessing is performed by nitrating the surface under a NH_3 (or N_2/H_2) atmosphere or nitrifying the surface under a N_2O or O_2 atmosphere.

Claim 13 (currently amended) The method for manufacturing a tantalum oxy nitride capacitor according to claim 1, wherein the nitrating or nitrifying of the surface of the tantalum oxy nitride thin film is performed at a temperature ranging from about 200°C to about 600°C by using a plasma.

Claim 14 (original) The method for manufacturing a tantalum oxy nitride capacitor according to claim 1, wherein the upper electrode is formed by depositing a material selected from the group consisting of poly silicon (Poly Si), titanium nitride (TiN), tantalum nitride (TaN), tungsten (W), tungsten nitride (WN), tungsten silicide (Wsi), ruthenium (RU), ruthenium oxide (RuO₂), iridium (Ir), platinum (Pt), individually or repeatedly to form a stacking structure.

Claim 15 (original) A semiconductor device comprising a capacitor made in accordance with the method of claim 1.

And conclude